

64. A method according to claim 63, further comprising measuring the temperature of the heated wort entering the column and controlling internal pressure inside the column to adjust said pressure at a level such that the boiling point of said wort at said level corresponds to said temperature of the heated wort entering said column.

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65. A method according to claim 63, further comprising measuring the internal pressure inside the column and adjusting the temperature of the heated wort entering said column at the boiling point of said wort at said internal pressure.--

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REMARKS

Re-examination and favorable reconsideration in light of the above amendments and the following comments are respectfully requested.

Claims 28, 32, 33, and 35 - 62 are pending in the application. Currently, no claim stands allowed. By the present amendment, claims 49, 51, and 52 have been cancelled; claims 48, 50, and 56 have been amended; and new claims 63 - 65 have been added to the case.

In the office action dated June 19, 2000, claims 28, 32, 33, and 35 - 62 were rejected under 35 USC 112, second paragraph, as being indefinite.

Furthermore, claims 28, 32, 33, 35 - 49, 54, 55, and 57 - 62 were rejected under 35 U.S.C. 103(a) as being unpatentable over U.S.P. 3,933,953 to Leva in view of U.S.P. 5,645,953 to McNulty et al., U.S.P. 5,387,377 to Chuang, and Hardwick, Handbook of Brewing, pages 294-299. The Examiner contends that Applicant has added new claims with limitations directed to the size of the filter bodies, the absence of significant foam formation, flow rate of inert gas and increasing the surface area of contact between gas and wort. The Examiner further contends that the limitation directed to the filter bodies would have been obvious to those of ordinary skill in the art to modify the size of the filter bodies as this characteristic is a result effective variable that is typically optimized by hose in the art. The Examiner further contends that the remaining claim limitations are considered to be inherent with or directed to the intended use of the claimed apparatus and are therefore met by the prior art disclosures.

Still further in said office action, claim 53 was rejected under 35 U.S.C. 103(a) as being unpatentable over the aforementioned Leva, McNulty, Chuang, and Hardwick references and further in view of U.S.P. 5,106,544 to Lee et al. The Examiner contends that the Leva, McNulty,

Chuang and Hardwick references do not disclose a distribution means comprised of secondary pipes with orifices. The Examiner contends that this limitation is considered to be notoriously well known in the contact arts. The Examiner cites Lee et al. as teaching that the prior art relies on a distributor that can be seen to comprise a main pipe and secondary pipe that inherently have orifices for distributing liquid. The Examiner contends that it would have been obvious to those of ordinary skill in the art to use the distribution means of Lee et al. in the process means as disclosed by the cited art as it is a well known distribution means.

Finally, the Examiner rejects claims 51 and 52 under 35 U.S.C. 103(a) as being unpatentable over Applicant's alleged admissions in view of U.S.P. 4,550,029 to Kruger et al. in view of Leva, McNulty, Chuang and Hardwick. The Examiner contends that Applicant admits the well known processing of beer wort to remove unwanted volatile flavors. The Examiner further contends that Leva, McNulty, Chuang and Hardwick do not teach the use of apparatus for treating beer wort. The Examiner contends that Kruger et al. teaches treating beer wort with steam or an inert gas in a counter-flow gas/liquid contacting column, and the injection of steam/inert gas into a wort to degas and free

the wort from undesirable foreign substances and additionally saves energy. The Examiner contends that an apparatus is associated with the boiling whereby the wort is sprayed in at the top while the steam/inert gas is injected into the bottom. The Examiner concludes that it would have been obvious to those skilled in the art to perform the prior art process of the alleged admitted prior art or Kruger et al. in apparatus as taught by Leva in view of McNulty et al. further in view of Chuang and further in view of Hardwick because said means are commonly used for separation processes such as that taught by the prior art.

The foregoing rejections are traversed by the instant amendment.

The present invention relates to a device for eliminating unwanted volatile components from beer wort comprising a counter-current contact column for contact between an ascending current of steam or inert gas and a descending current of wort at a temperature substantially equal to the boiling point of said wort at the pressure in the column. The column contains filter bodies to increase the surface area of contact within the column between the wort and the current of steam or inert gas. The device further has means for feeding and uniformly distributing the beer wort into the column located in a top part of the

column and comprising a distribution plate substantially perpendicular to a longitudinal axis of the column. The distribution plate is disposed under a wort feed into the column at the level of the top part of the column. The distribution plate includes first means for uniform flow of the wort in the descending direction and second means for flow of said current of inert gas or steam in the ascending direction. The first means for uniform flow of the wort comprises a plurality of orifices in the distribution plate and the second means for flow of the current of inert gas or steam comprises a plurality of chimneys on a surface of the distribution plate. The plurality of orifices in the distribution plate is sufficient in number and diameter to allow a predetermined flow rate of the wort, to provide a depth of the wort on top of the plate, and to prevent the passage of steam or inert gas through the orifices and thereby substantially prevent foaming of the wort at the level of the top part of the column. The means for feeding and uniformly distributing the current of steam or inert gas inside the column is located in a bottom part of the column and comprises a bottom plate arranged substantially perpendicular to the longitudinal axis of the column. The bottom plate has means for increasing the surface area of contact. The means for increasing the surface area of

contact comprises a number of orifices in the bottom plate such that a total surface area through which the current of inert gas or steam passes upwardly and the current of wort passes downwardly is equal to at least 90% of a transverse surface area of the column so as to substantially prevent foaming of the wort at the level of the bottom plate.

The present invention is also directed to a method of eliminating unwanted volatile components from a beer wort in a column by counter current contact between a descending current of heated wort and an ascending current of heated steam or inert gas at a predetermined internal pressure in the column. The method comprises the steps of heating the wort at a temperature substantially equal to the boiling point of the wort at the internal pressure and separating unwanted volatile components from the wort. The separating step comprise providing a column having a distribution plate at the level of a top part of the column and a bottom plate at the level of a bottom part of the column, which bottom plate has orifices providing a free surface area of at least 90% of the cross sectional area of the column. The distribution plate comprises a plurality of orifices for uniform flow of the wort in the column and a plurality of chimneys on a top surface of the distribution plate for uniform flow of steam or inert gas in the column. The

separating step further comprises introducing the heated wort into the column above the distribution plate. The method further comprises passing the wort through the orifices in the distribution plate in a descending direction and at a flow rate which allows a volume of wort to build up on the top surface of the distribution plate, while allowing the steam or inert gas to separately ascend through the chimneys of the distribution plate so as to reduce contact between the wort and the inert gas or steam, and while avoiding any significant formation of foam at the level of the top part of the column. The method further comprises creating an ascending current of the inert gas or steam at a temperature substantially equal to that of the heated wort inside the column beneath the bottom plate and placing the descending wort flow in contact with the ascending current of the inert gas or steam so as to eliminate the unwanted volatile compounds by flowing the wort through filler bodies directly supported by the bottom plate while avoiding any significant formation of foam at the level of the bottom part of the column and at the level of the filler bodies.

With regard to the rejection under 35 U.S.C. 112, second paragraph, it is submitted that the phrases "substantially preventing foaming", "significant formation

of foam", and "substantially perpendicular" are definite and well supported by the specification in the instant application. The words of these phrases are used in their ordinary context and when read in light of the specification would be clearly understood by one of ordinary skill in the art. For example, one of ordinary skill in the art would readily understand the phrase "substantially preventing foaming" as meaning that not all foaming is prevented; would readily understand the phrase "significant formation of foam" as meaning that some foam is formed but not a significant amount; and would readily understand the phrase "substantially perpendicular" as meaning "perpendicular" and orientations slightly variant from perpendicular. The Examiner in making this rejection offers no insight in the office action as to what his particular problems are with regard to the aforementioned phrases. It is submitted that the Examiner's failure to clearly set forth the basis for this rejection renders it untenable. The Examiner is hereby requested to withdraw the rejection.

With regard to the rejection of claim 56 under 35 U.S.C. 112, second paragraph, the phrase "free from any rack" has been deleted from the claim.



With regard to the rejection of claims 28, 32, 33, 35 - 49, 54, 55, and 57 - 62 on obviousness grounds, it is submitted that the prior art does not teach or suggest the subject matter of these claims and the unexpected results obtained by the device and the method of the present invention. Attached hereto is the declaration of Stephane Dupire which explains the unexpected results obtained by Applicant using the device and the method of the present invention.

Mr. Dupire in paragraph 3 of his declaration explains that special difficulties are met in the case of stripping a beer wort. Beer wort is an unstable suspension containing impurities which may easily settle. Importantly, beer wort is also a suspension which has a great tendency towards foaming, particularly when in a very divided state. In the case of stripping a beer wort, there will be in a column loaded with filler bodies a much higher tendency of the wort towards foaming than in a tray column. The high tendency of the wort to foam when in a divided state results in a large volume of foam occupying the whole internal volume of the column, thereby greatly perturbing the liquid/gas contact conditions and leading to low liquid flow rate and bad and low stripping efficiency. In order to control wort foaming, Applicant had to avoid

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systematically any intensive flow of the steam through the wort, any considerable movement of the wort, and any intensive formation of vapor bubbles in the wort. The device and the method of the present invention accomplish this.

The method and device of the present invention, according to Mr. Dupire, provide the very surprising and unexpected result that within a stripping column equipped with internal appliances providing a low gas/liquid contact surface area, it is possible to obtain a quite satisfactory DMS elimination ratio using a very low steam flow rate corresponding to a very low steam to wort ratio of about 1.5%, more generally between 0.5 and 3%, for a very satisfactory wort flow rate.

According to Mr. Dupire, wort foaming is avoided by the present invention by the inclusion in the column upper zone of an upper distributing plate having orifices for the passage of wort and upstanding chimneys for the passage of steam or inert gas, thereby distilling regularly and uniformly the wort across the whole cross-section of the column, while separating completely the wort from the steam or inert gas and accordingly considerably decreasing the contact therebetween in this zone. By using a filler body of relatively large diameter of correspondingly relatively

low exchange surface area per unit volume, the wort/steam or gas exchanges are reduced.

Applicant, according to Mr. Dupire, has advantageously eliminated the racks which are ordinarily used to load the filler bodies. As a result, the stripping column in the device of the present invention can be easily emptied for cleaning purposes.

Applicant, according to Mr. Dupire, further advantageously uses a bottom plate to support the filler bodies, which bottom plate has a plurality of orifices with a total passage area equivalent to 90 or 100% of the total cross section area of the column, thereby maximizing the passage of the wort and the steam or inert gas but minimizing wort/steam or inert gas contact in this zone. Under this plate, an inclined plate is provided to recover the wort avoiding that which would tend to increase the foam.

Mr. Dupire has found that by providing these elements in Applicant's device and by performing the method claimed in this case that Applicant has made it possible to obtain reliably, and reproducibly, a DMS elimination ratio of more than 85% with a steam consumption of about 1 or 1.5%. According to Mr. Dupire, each one of the efforts made by Applicant to minimize wort foaming has rendered smoother

the liquid/gas or steam contact conditions and have improved the stripping yield, thereby unexpectedly and synergistically making it possible to decrease the gas/steam flow rate and to increase the wort flow rate until reaching the above mentioned figures without any detrimental effect on the DMS elimination ratio.

Still further, with regard to the present invention, Mr. Dupire notes that the pressure inside the column is measured and used to determine the boiling temperature of the wort at the pressure. The wort entering the column will be preheated to the boiling temperature. Similarly, the steam introduced in the column will be saturated steam at the pressure. Accordingly, there will be no steam condensation for heating the wort, and no wort boiling which would uselessly consume energy. As a matter of fact, should the wort have to be heated in the column, this would be done by a part of the packing which would become inefficient for the stripping. Should an inert gas be used instead of steam, the inert gas would be introduced substantially at the same temperature as the wort.

According to Mr. Dupire, none of the cited and applied references teaches or suggests:

- introducing into the column the wort at a temperature equal to the boiling point of the wort at the pressure inside the column;

- to organize the gas/liquid exchanges and to select column internal appliances organizing such exchanges, so as to avoid any significant formation of the foam; and

- to provide a bottom plate comprising a number of orifices such that a total surface area through which the current of steam or inert gas passes upwardly and the current of wort passes downwardly is equal to at least 90% of a transverse surface area of the column.

Claim 28 is directed to the device of the present invention. It calls for a counter current contact column having an ascending current of inert gas or steam and a descending current of wort. The column contains filler bodies which increase the surface area of contact within the column between the wort and the current of steam or inert gas. It also includes a distribution plate disposed under the wort feed into the column at the top level of the top part of the column. The distribution plate has a plurality of orifices sufficient in number and diameter to allow a predetermined wort flow rate, provide a depth of wort on top of the plate, to prevent the passage of steam or inert gas through the orifices, and to substantially

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process limitation  
yes

prevent foaming of the wort at the level of the top part of the column. The inert gas or steam flows through a plurality of chimneys on a surface of the distribution plate. The column also has a bottom plate having a number of orifices such that a total surface area through which the current of inert gas or steam passes upwardly and the current of wort passes downwardly is equal to at least 90% of a transverse surface area of the column so as to substantially prevent foaming of the wort at the level of the bottom plate.

It is submitted that the cited and applied references taken individually, or collectively, do not teach or suggest this combination of elements. The Leva patent is cited by the Examiner for its showing of a liquid/gas contacting apparatus whereby heated oil to be deodorized enters via a pipe from a preheater and steam enters via a pipe. The oil is emptied on top of the liquid distributor and then onto a plate. The Examiner contends that the distributor allows liquid to feed through small pipes and that the gas rises up through a plurality of larger openings or chimneys that are separate from the liquid feed pipes. Leva however has nothing to do with the art of beer making. Rather, Leva is directed to an apparatus and method for stripping fatty acids and removing objectionable

odors and flavors from oils and fats. It should be noted that Leva strongly teaches away from using packings or filler bodies for viscous liquids as necessitating a much bigger height for packed towers than for plate towers. *where?*

McNulty et al. is cited by the Examiner as teaching gas/liquid contact apparatus that contains a liquid collector-distributor device that include chimneys that operate as gas risers, and a plurality of chimney hats that are inclined. A review of McNulty et al. however shows that it teaches, in column 4, lines 6 - 8, that the total cross sectional area of the gas risers or chimneys represent only about 10 to 15% of the overall cross sectional area of the tray surface. *not claimed* Nothing in McNulty teaches or suggests the specific features of Applicant's bottom plate.

The Chuang patent is cited by the Examiner as teaching a packed column whereby filler bodies are located under a liquid distribution arm. A review of Chuang shows that it teaches loading the rings above active liquid frothing (foaming) and distributing trays which cause the liquid immediately above them to be frothed to level 23. Chuang teaches provoking foaming to improve transfers between liquid and gas. In addition, Chuang teaches, in column 4, lines 30 -36 and 62 - 65 that the perforated area of the *Process limitation*

trays supporting the filler bodies can be in a range of 10% to 40%, or preferably from 20% to 40%, of the cross sectional area of the column.

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Hardwick is cited as teaching that brewing kettles are routinely installed with "clean-in-place" means for cleaning the vessel. The Examiner in applying Hardwick clearly acknowledges that Hardwick does not put the cleaning means in a packed tower.

Nowhere in the latest office action, or the previous office action, does the Examiner explain how the various references meet the limitations of claim 28. He merely makes broad conclusory statements that the claimed elements can be found in the references. Further, the Examiner does not explain why one of ordinary skill in the art would be motivated to combine these references in the manner suggested by him. With regard to these points, an examiner must identify specifically the reasons why one of ordinary skill in the art would have been motivated to select the references and combine them. *In re Rouffet*, 47 USPQ2d 1453, 1459 (Fed. Cir. 1998). Further the showing of motivation made by the examiner must be clear and particular. Broad conclusory statements regarding the teachings of multiple references standing alone can not act as "evidence" of obviousness. *C.R. Bard, Inc. v. M3 Sys.*



Inc., 48 USPQ2d 1225, 1232 (Fed. Cir. 1998). In this case, the Examiner has not met his burden of making a prima facie case of obviousness. There is no clear statements as to what claimed elements can be found in each reference and how the references are being combined. Further, there is no analysis which would help one understand why the references are combined and what would lead one to combine them, particularly where references such as Leva and McNulty have nothing to do with the problems addressed by Applicant. At best, one can only characterize the rejection made by the Examiner as being nothing more than attempted hindsight.

With regard to the statements made by the Examiner in paragraph 19, the Examiner has not shown where the limitations of claim 28 can be found in the references. Paragraph 19 is nothing more than the type of broad conclusory statements which the Courts have said are insufficient to establish a case of obviousness. With regard to the Examiner's comments in paragraph 18, it is plain error to ignore the fact that the device of the present invention is used for beer wort when the problem which Applicant is solving has to do with the production of beer wort and when the claim clearly talks about transporting a wort.

With regard to dependent claims 32, 33, 35 - 48, 50, and 53 - 56, these claims are allowable for the same reasons as claim 28 as well as on their own accord. The references applied by the Examiner do not teach or suggest the elements set forth in the claims particularly in combination with the elements set forth in claim 28. For example, the cited and applied references do not teach or suggest the corrugations in the bottom plate and the orifice construction set forth in claim 35 and/or the wort collecting means comprising at least one preferably inclined surface directed towards the bottom of the column, which surface has means forming a baffle directed toward the bottom of the column of claim 40.

Claim 57, and its dependent claims, are allowable because none of the cited and applied references teach or suggest the claimed structures. There is nothing in the cited and applied references which would teach one of ordinary skill in the art to provide any means for avoiding any significant formation of foam. The cited and applied references also do not teach or suggest the at least one inclined surface and baffle of claim 58, the orifices and chimney construction of claim 59, the orifice construction of claim 60 (particularly the at least 90% of transverse

surface area limitation), the flow rate of claim 61, and the filler bodies of claim 62.

With regard to the rejection of claims 53, the Lee et al. patent does not cure the deficiencies of the Leva, McNulty, Chuang and Hardwick patents. Thus, claim 53 is allowable for the same reasons that claim 28 is allowable.

With regard to the rejection of claims 51 and 52 over Applicant's alleged admission in view of Kruger et al. in view of Leva, McNulty, Chuang, and Hardwick, these claims have been cancelled in favor of new method claims 63 - 65. It is submitted that the aforementioned cited and applied references do not teach or suggest the subject matter of these claims.

With regard to Applicant's alleged admission, the Examiner has not specifically identified the source of this alleged admission; however, Applicant will clearly state here that they have not admitted that the method of former claims 51 and 52 and the method of new claims 63 - 65 is known in the art.

New claim 63 is specifically directed to the matters stated in paragraph 8 of the Dupire declaration. Its limitations are not taught or suggest by the cited and applied references. For example, Kruger et al. teaches spraying the wort in several directions with the wort

falling then on an upper tray. The wort sprayed by Kruger et al. will provoke foaming with the foaming being increased when the wort falls on the upper tray.

Leva, as mentioned before, teaches a distribution plate having large diameter chimneys for the passage of steam or inert gas and small tubes for passage of wort, with the tubes being introduced in orifices of the distribution plate and extending upwardly above the top surface of the distribution plate. Such small tubes are undesirable and excluded from claim 63. Still further, Leva teaches away from using packings or filler bodies for viscous liquids as necessitating a much bigger height for packed towers than for plate towers. Claim 63 goes in a direction opposite that of this teaching.

Leva also does not teach, and in fact teaches away, from stripping a beer wort at the boiling temperature of the wort and strongly teaches away using an upper liquid distribution plate in combination with packings.

Nothing in McNulty teaches or suggests the bottom plate employed by Applicant in the method of the present invention. Further, the total cross sectional area of the gas risers or chimneys is only about 10 to 15% of the overall cross sectional area of the tray surface.

With regard to Chuang, its teachings would lead to a substantial amount of foaming, something which Applicant's method avoids.

Hardwick has nothing to do with the method of the present invention.

For these reasons, claim 63 is allowable over the cited and applied prior art. Claims 64 and 65 are allowable on their own accord as well as for the same reasons that claim 63 is allowable. None of the cited and applied art teaches the subject matter of these claims.

In the aforesaid office action, the Examiner objected to Applicant's amendments to the drawings on the grounds that they introduce new matter into the drawings. The Examiner is hereby requested to reconsider his position and withdraw this objection. The amendments to the drawings merely shows the cleaning balls described in the original specification. Page 11, lines 13 - 15 of the original specification clearly states that one or more distributors are located in "various regions of the column". On page 11, lines 16 - 22, the original specifications describes certain illustrative positions for the distribution means within the column. Still further, on page 11, lines 23 - 26, the distributors are described as being cleaning balls. It is submitted that the amendments to Fig. 1 are well

supported by the original specification and that no new matter has been added to the case by these drawing amendments.

Further, the Examiner objects to the amendments made to the specification in the amendment filed April 6, 2000 as containing new matter. This position is in error and the Examiner should withdraw the objection. The only amendment made to the specification is the addition of reference numbers for material originally described. The addition of reference numbers in and by itself could not possibly be new matter. With regard to the Examiner's contention that Applicant has added written disclosure to show where the distribution balls are located, no such thing has occurred. Again, the only amendment to the specification was to add reference numbers to the text. The text with regard to the location of the distribution balls within the column is original to the case.

For the reasons stated above, the instant application is believed to be in condition for allowance. Such allowance is respectfully solicited.

The instant amendment does not require any new search to be conducted by the Examiner and does not add any new matter. Still further, there is nothing in this amendment which has not been addressed before. Independent device

claims 28 and 57 remain unamended. New claim 63 is a method version of claim 28.

A Notice of Appeal is attached hereto in the event that the Examiner maintains the rejections of record. Also attached hereto is a Request for a Three (3) Month Extension of Time.

A check in the amount of \$1,200.00 is enclosed herewith to cover the Notice of Appeal and Extension of Time Fees. Should the Commissioner determine that an additional fee is due, he is hereby authorized to charge said fee to Deposit Account No. 02-0184.

Should the Examiner believe that an additional amendment is needed to place the case in condition for allowance, he is hereby invited to contact the undersigned attorney at the telephone number listed below.

Respectfully submitted,

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